APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/004,090	10/23/2001	Michael Kowalchik	EMR-00301	9342

47653 7590 08/15/2005		

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EXAMINER
CHACE, CHRISTIAN

ART UNIT	PAPER NUMBER
2189	

DATE MAILED: 08/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	**Applicant(s)**
Office Action Summary	10/004,090	KOWALCHIK ET AL.
	Examiner	**Art Unit**	
	Christian P. Chace	2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _29 March 2005 and 11 April 2005_.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-9,12-20,22-27 and 30-35_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-9,12-20,22-27 and 30-35_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _23 October 2001_ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _3/29/05_.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Response to Amendment

This Office action has been issued in response to amendments filed 29 March 2005 and 11 April 2005. Claims 1-9, 12-20, 22-27, and 30-35 are pending. Applicants' arguments have been carefully and respectfully considered, and some are persuasive while others are not. However, as applicants point out in the most recent response, examiner did not address claim 30 in the previous Office action. This was an oversight, and examiner apologizes sincerely for any inconvenience this may have caused. Accordingly, this action has NOT been made final.

Claim Objections

Claims 20 and 33 are objected to because of the following informalities: They recite, "at lest 3.5 inches." It appears this should be, "at least 3.5 inches." Appropriate correction is required.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the subject matter claimed in claims 30-35 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet,

and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next

Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 35 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply

with the written description requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor(s), at the time the application was filed, had

possession of the claimed invention. The specifically claimed subject matter of claim 35

does not appear to be in the disclosure as originally filed, and, accordingly, appears to

be new matter is thereby rejected.

Claims 31-34 are rejected under 35 U.S.C. 112, first paragraph, because the

specification, while being enabling for hierarchical RAID schemes, does not reasonably

provide enablement for the second RAID controller sending the first RAID controller

"RAID data" when implementing the second RAID scheme (claim 32); the entire

recitations of claims 31, 33 and 34. The specification does not enable any person

skilled in the art to which it pertains, or with which it is most nearly connected, to make

and/or use the invention commensurate in scope with these claims. In applicants'

response of 29 March 2005, on page 14 of the remarks, applicants cite alleged support

for the respectively claimed subject matter. However, for claim 31, the specification at

page 11, line 10, merely sets forth intended uses of the disclosed system. For claims

32 and 34, the specification at page 10, line 15 into page 11, line 9 was cited for support

for (and enablement of) the claimed subject matter. However, it does not appear to

provide said support. The specification at page 8, line 2 into page 9, line 17 was cited

as providing support for claim 33. However, that citation does not appear to discuss the

claimed subject matter.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly
claiming the subject matter which the applicant regards as his invention.

Claims 30-31 and 33 are rejected under 35 U.S.C. 112, second paragraph, as

being indefinite for failing to particularly point out and distinctly claim the subject matter

which applicant regards as the invention.

With respect to independent claim 30, it appears applicants are attempting to

claim 2 RAIDS in the same disks. It is unclear how, then, this would be hierarchical

(first and second-tier). In addition, the third paragraph recites, "second-tier RAID control circuitry coupled to the array of storage devices." Is this array the set? Is it the first array? IN addition, it is unclear what a "storage sub-device" is.

Claim 31 depends upon claim 30 and is rejected for at least the reasons set forth supra with respect to same.

With respect to claim 33, the word "consisting" in line 3 is "close-ended." "Essentially" is open-ended. Which is it? What are the metes and bounds of "consisting essentially of?"

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 12-20, and 22-27, and 30-34 are rejected under 35 U.S.C. 102(b) as being anticipated by Brant et al (US Patent #5,805,787).

With respect to independent claim 1, a data storage device is disclosed in figure 1, #16.

More than two disk drives are disclosed in figure 1 as #22. Those disk drives having platter sizes less than 3.5 inches in diameter is disclosed in column 3, lines 44-46.

A controller that accesses the disk drives in response to received I/O requests (column 5, line 35, for example) is disclosed in figure 1 as #20, and it's operation is

further discussed in column 6, line 35, for example. I/O is merely the tasks of gathering data for a computer or program to work with, and making the results of the computer's activities known to the user or other processes. Gathering is usually performed by input devices such as keyboard, mouse, and/or disk drives, while the output is usually made available to the user via the display and the printer and via the disk files or communications ports for the computer.

The controller "simultaneously performing at least a part of at least two write operations onto said more than two disk drives in response to at least two different write requests is disclosed in column 1, lines 44-45 as "servicing [two different write] requests in parallel," in column 2, lines 55-56 as, "A given controller can concurrently service a plurality of data recovery operations," and in column 5, lines 29-31 as, "A storage subsystem that has the MB cost of disk coupled with the performance of many disks operated in parallel can fill several intermediate slots in this hierarchy."

The controller comprising a controller configured to implement or access the more than two disks in, a RAID scheme is disclosed in column 5, lines 34, 36, and 44, in general. RAID stands for, "Redundant Array of Independent Disks." In this case, column 5, line 59 recites "Controller 20 can include independent paths to write data to its memory in a mirrored fashion." Mirroring is redundant storage of data. The cache being an array is disclosed in column 4, line 15, for example. Figure 1 clearly shows separate disks, and, therefore, independent disks. Therefore, RAID is explicitly disclosed embodied in the invention of Brant et al.

The scheme implemented by the controller comprising a RAID scheme is disclosed as discussed supra with respect to instant claims 10, 21, and 28. The RAID scheme being independent of a hierarchically higher RAID controller that sends the data storage device data is discussed in column 5, lines 12-35. By stating that the system of Brant et al, which includes RAID, as discussed in the cited passage, that the storage subsystem can fill **several** intermediate slots in the hierarchy, as stated in line 31 of the instant passage, Brant et al anticipates hierarchically higher RAID controllers.

With respect to claims 2 and 25, a device interface to receive I/O requests is disclosed in figure 1, #16.

The device interface comprising an interface configured to conform to a protocol is disclosed in column 6, lines 39-44, where the protocol is "SCSI-type connections."

With respect to claims 3 and 26, the protocol comprising at least one of the following: SCSI, Fibre Channel, and "Infiniband" is disclosed in column 6, lines 39-44, which specifically discloses SCSI.

With respect to claims 4 and 27, the platter sizes comprising at least one of the following platter sizes: 2.5 inches, 1.8 inches, and 1 inch in diameter is disclosed in column 3, lines 44-46, which not only discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would work in the invention]. "Or smaller" would include the 1 inch diameter as well.

With respect to claims 5, 17, and 23, at least one of the disk drives comprising an IDE drive is disclosed in column 6, lines 22-24.

With respect to claims 6 and 22, the more than two disk drives having platter

sizes less than 3.5 inches in diameter comprising more than two disk drives having

platter sizes 2.5 inches or less in diameter is disclosed in column 3, lines 44-46, which

not only discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would

work in the invention]. "Or smaller" would include the 1 inch diameter as well.

With respect to claim 7, the more than two disk drives having platter sizes less

than 3.5 inches in diameter comprising more than two disk drives having platter sizes

one inch in diameter or less is disclosed in column 3, lines 44-46, which not only

discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would work in

the invention]. "Or smaller" would include the 1 inch diameter and smaller as well.

With respect to claim 12, the RAID data comprising at least one of a stripe, an

error detection code, and an error correction code, is disclosed in column 3, lines 11-12

and 19-20, where reconstruction based on parity is error correction, and parity

comparisons are error detection. Striping is used in RAID applications, which are

discussed in column 5, lines 34, 36, and 44, for example.

With respect to claim 13, the data storage device performing cache operations,

said data storage device further comprising a cache manager is disclosed in figure 1 as

#20, and it's operation is further discussed in column 6, line 35, for example.

With respect to claim 14, the cache manager comprising a manager configured

to perform at least one of the following: translate an address of a different storage

device (for example, back-end storage), cache data included in a write request, load

data from the different storage device, and remove cached data is disclosed in column

6, line 35, for example. The controller #20 in Brant et al performs the functions of the instantly claimed cache manager as well as the instantly claimed controller of instant claim 1.

However, it happens that all of the following are anticipated by the cited prior art of record, with the instant claim limitations in parenthesis along with the relevant citation in Brant et al:

Requesting data from a back-end storage system (which inherently requires translating the address of that different storage system) (see column 6, lines 50-51);

Retrieving requested data (caching data included in a write request and loading data from the different storage device) from the [at least two] disks [making up the cache] (see column 4, lines 9-19);

Sending data to the back-end system for writing (column 6,lines 50-51);

Determining the location of back-end system data (more address translation) within the [at least two] disks [making up the cache] (column 4, lines 32-48).

Removing data from the [at least two] disks [making up the cache] (removing cached data) (column 4, lines 42-44).

With respect to claim 15, a controller card that includes the controller and connections available to couple with more than one storage card that provides access to the [a] the [at] least two of the [disk] drives is disclosed in column 5, lines 41-45, which discloses ASIC based daughter cards which the disclosed products of Brant et al can be based on. These products of Brant et al are what examiner is rejecting the

instant claims over, so it logically follows that "these products" apply to the instant claim

language.

With respect to claim 16, the storage card comprising a card having at least one

parallel interface to a collection of the drives is disclosed column 5, line 30 as well as

lines 41-45, for the reasons as discussed supra with respect to claim 15.

With respect to claim 18, the connection between the controller and storage card

comprising a serial connection is disclosed in column 6, line 41, as "SCSI-type

connections." SCSI has a serial as well as a parallel "type" connection, and, therefore,

the cited passage anticipates the instant claim language.

With respect to claim 19, the controller comprising a bank interface that routes

data requests to the appropriate bank of drives is disclosed in figure 1 as #15, as

discussed in column 5, lines 54-56, for example.

With respect to independent claim 20, a data storage system is disclosed in

figure 1.

At least one first data storage device is disclosed in figure 1 as #25. The storage

device having a platter size of at least 3.5 inches in diameter is disclosed in column 5,

line 39. The hierarchy listed in column 5, from line 12 to line 28, shows the lower levels

of the hierarchy having higher capacity disks. To increase capacity on a disk that uses

a standard method of data storage, one must, inherently, increase the physical size, or

platter size, of that disk.

At least one second data storage device is disclosed in figure 1 as #16.

A device interface for receiving I/O requests (see claim 1 supra) is disclosed in

figure 1 as #11.

A first controller configured to receive I/O requests from the [device] interface is

disclosed in figure 1 as #20.

More than two disk drives coupled to the controller are disclosed in figure 1 as

#22, coupled by #15. The disk drives having platter sizes less than 3.5 inches in

diameter is disclosed in column 3, line 45, for example.

The controller "simultaneously performing at least a part of at least two write

operations onto said more than two disk drives in response to at least two different write

requests is disclosed in column 1, lines 44-45 as "servicing [two different write] requests

in parallel," in column 2, lines 55-56 as, "A given controller can concurrently service a

plurality of data recovery operations," and in column 5, lines 29-31 as, "A storage

subsystem that has the MB cost of disk coupled with the performance of many disks

operated in parallel can fill several intermediate slots in this hierarchy."

A second controller that coordinates access to the at least one first storage

device and the at least one second storage device is disclosed in figure 1 as #24.

The controller comprising a controller configured to implement or access the

more than two disks in, a RAID scheme is disclosed in column 5, lines 34, 36, and 44, in

general. RAID stands for, "Redundant Array of Independent Disks." In this case,

column 5, line 59 recites "Controller 20 can include independent paths to write data to

its memory in a mirrored fashion." Mirroring is redundant storage of data. The cache

being an array is disclosed in column 4, line 15, for example. Figure 1 clearly shows

separate disks, and, therefore, independent disks. Therefore, RAID is explicitly

disclosed embodied in the invention of Brant et al.

The scheme implemented by the controller comprising a RAID scheme is

disclosed as discussed supra with respect to instant claims 10, 21, and 28. The RAID

scheme being independent of a hierarchically higher RAID controller that sends the data

storage device data is discussed in column 5, lines 12-35. By stating that the system of

Brant et al, which includes RAID, as discussed in the cited passage, that the storage

subsystem can fill **several** intermediate slots in the hierarchy, as stated in line 31 of the

instant passage, Brant et al anticipates hierarchically higher RAID controllers.

With respect to independent claim 24, a method of servicing data access

requests at a data storage device is disclosed in column 2, lines 46-53, for example.

Receiving data access requests at a device interface is discussed in column 6,

lines 39-44, for example. The host sends and receives data through interface #11 in

figure 1.

Accessing more than two disk drives (figure 1, #22) having platter sizes less than

3.5 inches in diameter (column 3, line 45) in response to the received data access

requests is disclosed in column 6, lines 39-48.

"Simultaneously performing at least a part of at least two write operations onto

said more than two disk drives in response to at least two different write requests is

disclosed in column 1, lines 44-45 as "servicing [two different write] requests in parallel,"

in column 2, lines 55-56 as, "A given controller can concurrently service a plurality of

data recovery operations," and in column 5, lines 29-31 as, "A storage subsystem that has the MB cost of disk coupled with the performance of many disks operated in parallel can fill several intermediate slots in this hierarchy."

The controller comprising a controller configured to implement or access the more than two disks in, a RAID scheme is disclosed in column 5, lines 34, 36, and 44, in general. RAID stands for, "Redundant Array of Independent Disks." In this case, column 5, line 59 recites "Controller 20 can include independent paths to write data to its memory in a mirrored fashion." Mirroring is redundant storage of data. The cache being an array is disclosed in column 4, line 15, for example. Figure 1 clearly shows separate disks, and, therefore, independent disks. Therefore, RAID is explicitly disclosed embodied in the invention of Brant et al.

The scheme implemented by the controller comprising a RAID scheme is disclosed as discussed supra with respect to instant claims 10, 21, and 28. The RAID scheme being independent of a hierarchically higher RAID controller that sends the data storage device data is discussed in column 5, lines 12-35. By stating that the system of Brant et al, which includes RAID, as discussed in the cited passage, that the storage subsystem can fill **several** intermediate slots in the hierarchy, as stated in line 31 of the instant passage, Brant et al anticipates hierarchically higher RAID controllers.

With respect to independent claim 30, as best as may be understood in light of the 112 issues discussed supra, it appears to be anticipated similar to claim 20, e.g., by Brant in column 5, lines 33-37.

As discussed supra, hierarchical RAIDs are disclosed by Brant et al. Inherently, each will have to be controlled, thereby requiring some sort of controller.

Claim 31 is merely an "intended use" claim, and has been given no patentable weight.

With respect to claim 32, again, if thee are two hierarchical RAIDs, they inherently are controlled by respective controllers, as disclosed in Brant as discussed supra.

With respect to claim 33, a cache controller is disclosed by Brant et al in figure 1, #20.

With respect to claim 34, Brant et al disclose a RAID cache and controller in figure 1, and as discussed supra with respect to claims 1 and 20, e.g. Brant et al disclose that these controllers may fill SEVERAL hierarchical slots in a memory system. Accordingly, the second structures claimed instantly are inherent as they are identical to the first structures, which are explicitly discussed supra.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brant et al as applied to claim 1, upon which the instant claims depend, above, and further in view of Eckerd et al (US Patent #6,078,498).

Brant et al teaches the data storage device as claimed in claim 1 of the instant application, and also teaches smaller form factor disk drives in column 1, line 42, for example.

The difference between Brant et al and the instant claims are the explicit recitations of a housing, the housing having one of the following form factors: standard, half-height, and low-profile.

However, Eckerd et al disclose a top cover cooperating with the base deck to form an internal, scaled environment for the disc drive in column 3, lines 22-25. This is a housing. In column 6, lines 18-30, Eckerd et al disclose that housing to be a standardized form factor, including low profile, nominal, and half-height.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, having the teachings of Brant et al and Eckerd et al before him/her, to utilize the housing and form factors of Eckerd et al in the invention of Brant et al, because smaller form factor disk drives permit disk subsystems to exploit performance advantages of having more disks to service requests in parallel, as discussed by Brant et al in column 1, lines 42-45, and because the relative configurations of the mounting plate and chassis can vary depending upon requirements of a given application, as discussed in column 5, lines 15-18 of Eckerd et al.

Allowable Subject Matter

Claim 35 may be allowable over the cited prior art of record if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 1st and 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Response to Arguments

With respect to applicants' mention of preliminary matters, examiner did not discuss claim 30 in the previous Office action. However, the claim is not allowable, as may be seen supra. Examiner again, however, apologizes very sincerely for any inconvenience this may have caused.

With respect to the drawings box checked in the previous Office action summary, examiner apologizes for the oversight. As noted in the Final rejection of 26 July 2004, the drawings had, at that time, been accepted by examiner. They are now, however, objected to as discussed supra.

With respect to the information disclosure statement, examiner has considered the statement, and a signed and initialed copy is attached hereto.

With respect to applicants' argument that Brant does not anticipate independent claims 1 and 21 because Brant does not disclose or suggest a controller configured to implement a RAID scheme wherein the RAID scheme is independent of a hierarchically higher RAID controller that sends the data storage device RAID data, as claimed by applicants, examiner respectfully disagrees. More specifically, applicants argue that Brant does no disclose interaction among the RAID configurations. However, the whole

point to a hierarchical system is to have faster memory access at the top of the

hierarchy, and slower access at the bottom. This is well-known to those of even

rudimentary skill in the art. Accordingly, the system of Brant, by using the term,

"hierarchical," is disclosing inherent interaction between the hierarchies, similar to L0-L3

caches in a PC, e.g. There must be interaction between the hierarchies such as write-

back or write-through policies to keep the data consistent and coherent, e.g. Otherwise,

the system would be useless. Why would anyone have multiple hierarchical levels

without any interaction?

If an I/O request is received at the third-level hierarchical RAID, it must have

come from a hierarchically higher RAID controller. Again, the way a hierarchical

memory system works, is that a read, for example, is issued to the closest and fastest

memory to the requesting processor in the hopes for faster access than to the lower,

slower memories. However, when the data is not at the highest level, it is forwarded to

the next-highest level, and so forth.

By filling SEVERAL intermediate slots ion the hierarchy, a method of maintaining

consistency of data at all levels is required – it is inherent. Accordingly, there have to

be transactions between the levels to update all of the data at all of the levels.

Applicants are encouraged to review Brant et al, US Patent 5,274,799, which is

incorporated by reference in the applied Brant reference supra, at column 1, line 19.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian P. Chace whose telephone number is 571.272.4190. The examiner can normally be reached on MAXI FLEX.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 571.272.4201. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christian P. Chace
Primary Examiner
Art Unit 2189